



Impact of Physical and Dietary Interventions on Alzheimer's Disease Progression: A Systematic Review and Network Meta-analysis

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233 RCTs | 28,420 participants

Evidence across cognitively normal adults, MCI, and dementia on the AD continuum.

Pairwise meta-analysis first

Physical and dietary interventions improved cognition; physical interventions also improved ability/QoL.

Dose-response + NMA

Moderate exercise dose and mind-body/combined exercise strategies emerged as key findings.

BACKGROUND & METHODS

AD lacks curative therapies; accessible strategies are needed. We compared physical/dietary interventions and modeled exercise dose across the AD continuum.

Ovid MEDLINE, Embase, and Cochrane searched to February 2025. RCTs across the AD continuum: cognitively normal, MCI, and dementia. Pairwise meta-analysis, network meta-analysis, SUCRA ranking, and dose-response modeling.

Study selection

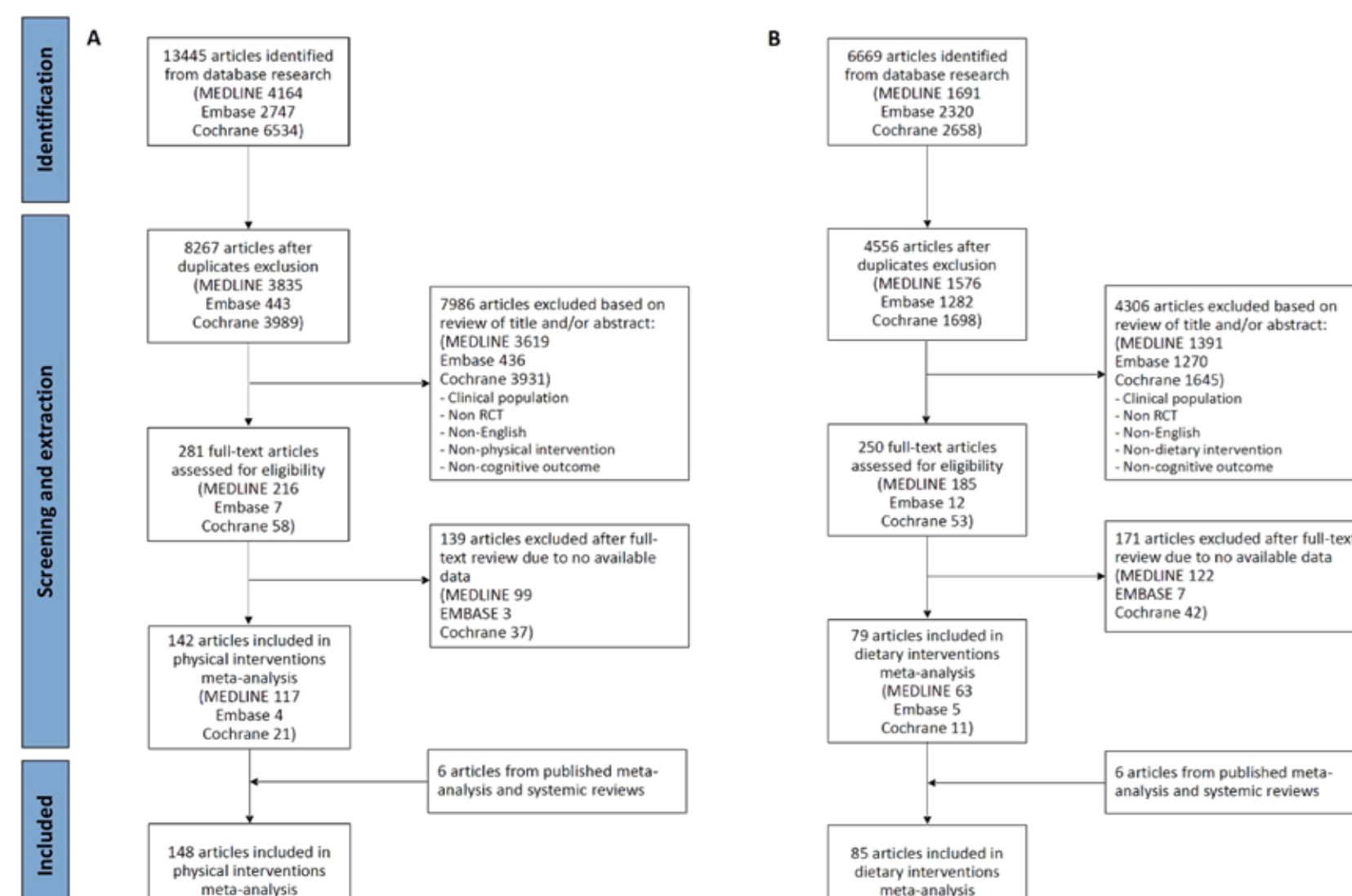


Figure 1. Flow diagram of study selection.

Study selection

142 physical and 79 dietary studies were included from databases, with 12 additional studies identified manually.

RESULTS

1. Evidence base

233 RCTs, 28,420 participants across NC, MCI, and dementia. Cognitive outcomes were available in all studies; 33 assessed ability/QoL.

2. Cognitive function

Cognition improved with physical interventions vs control (SMD 0.67) and health education (SMD 0.38). Dietary interventions also improved cognition (SMD 0.36).

3. Ability / quality of life

Physical interventions improved ability/QoL (SMD 0.40, 95% CI 0.21-0.60). Dietary interventions were not significant (SMD -0.00).

4. Dose-response analysis

The dose-response analysis encompassed 79 studies. The optimal cognitive improvements were observed with a training intensity of 3.5 Metabolic Equivalent of Task (MET) compared to the control group. Specifically, participants performing 665 MET minutes per week showed the greatest cognitive improvements.

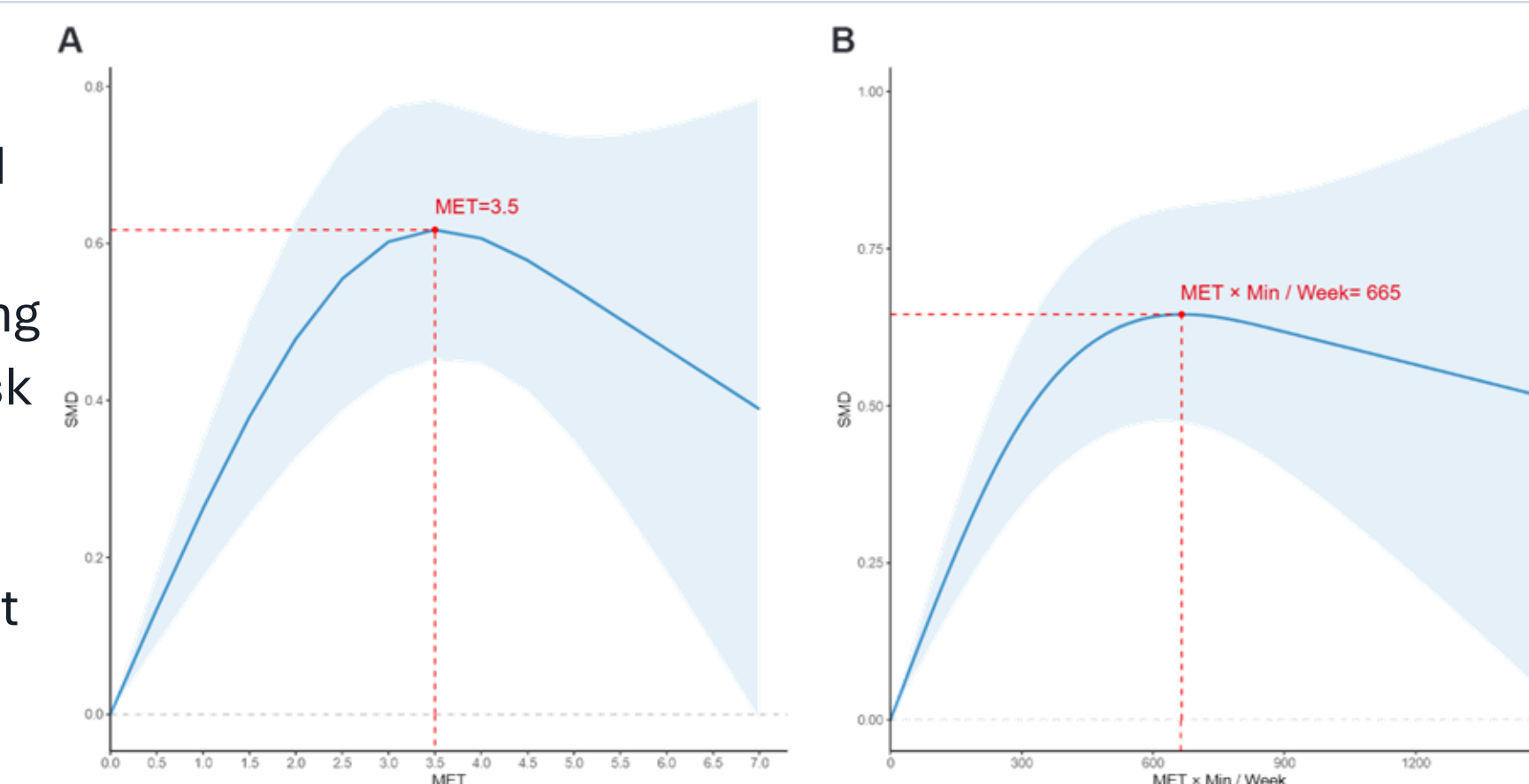


Figure 3. Dose-response effect of physical interventions on cognitive function.

5. Network meta-analysis

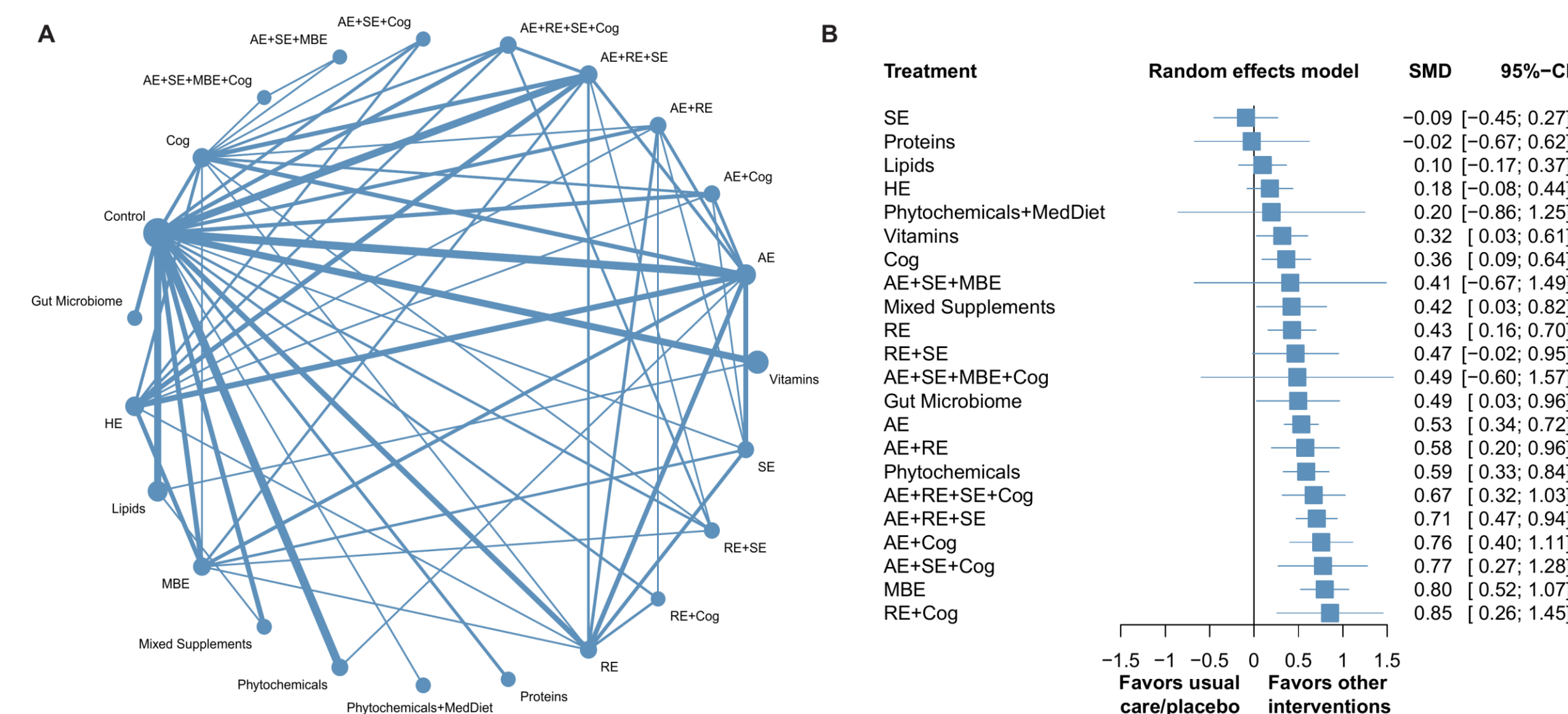


Figure 5. Network plot and forest plot comparing physical and dietary interventions with usual care/placebo.

INTERPRETATION

Physical interventions improved cognitive function, with robust sensitivity analyses. Moderate-intensity exercise showed an inverted U-shaped dose-response pattern. Dietary supplements, especially phytochemicals, gut microbiome products, mixed supplements, and vitamins, showed favorable cognitive effects.

Practical Message

An implementable regimen is approximately 45-60 minutes per session at ~3.5 MET, performed 3-4 times per week. Mind-body exercise may be particularly suitable for older adults with cognitive impairment.

Top-ranked interventions

1. Mind-body exercise
2. Resistance exercise + cognitive intervention
3. Aerobic exercise + cognitive intervention
4. Aerobic + stretching + cognitive intervention

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